MONTHLY REPORT

Contract [redacted]

25X1

PAR 217

24 Dec 64

SUBJECT: Optimization of Lasers

TASK/PROBLEM

1. Explore the production of 0.53 micron (blue-green) laser radiation by harmonic doubling in KDP and ADP crystals.

DISCUSSION

2. During this period continued empirical effort was directed toward reducing the lattice work structure in the second harmonic beam pattern. Having already shown that the structure is not a random phenomenon (FY-65 No. 2 Quarterly Report, 30 November 1964), attempts were made to determine if this structure was an inherent characteristic of the 1.06 micron fundamental beam or if it was generated by the K.D.P. crystal.

3. In the initial experiments, a 200mm lens was placed in the beam path between the KDP crystal and the film plane. Three lens positions were then chosen such that a cross section through the beam ahead of the crystal, in the crystal, and beyond the crystal would be in focus. The resulting exposures indicated that the structure was not dependent on focus. The only variations were those due to slight changes in magnification. Consistent with these results, it is considered that the crystal might be acting as a resonant cavity, producing interference fringes due to the slightly divergent laser beam. The reason for the lattice work structure rather than a circular or slightly elliptical interference pattern, however, is not completely understood.

4. A literature search is being conducted to provide possible basis for theoretical comparison of the harmonic doubling technique with other laser techniques for producing visible coherent radiation. The search is being made by a technical information group (library). No significant results have been reported to this date.

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PLANNED ACTIVITY

5. Effort will continue to understand the reasons for the pattern in the laser beam structure.

6. The literature search of paragraph 4 will be continued.